REMARKS

Reconsideration of this application is respectfully requested in view of the foregoing amendment and the following remarks.

Claims 1-26 are pending in this application. The Examiner has withdrawn claims 19-26 from consideration pursuant to an earlier restriction requirement. The Examiner objected to the drawings for failure to comply with 37 CFR 1.84(p)(5). Appropriate correction has been made in the attached Request for Approval of Drawing change. The Examiner also objected to the disclosure and the abstract for multiple omissions of "degree". Appropriate correction has been made. The Examiner Objected to claims 5-7, 12, and 16 for various informalities. Appropriate correction has been made to the claims to obviate these objections. The Examiner rejected claims 1-6, 9-10, and 13 under 35 USC § 102(b) as being anticipated by Mihalca et al., rejected claims 1-6, 8-10, 12, and 16 under 35 USC § 102(e) as being anticipated by Nakamura; rejected claims 1-8, and 16 under 35 USC § 102(b) as being anticipated by Lia; rejected claim 11 under 35 USC § 103(a) as being unpatentable over Mihalca or Nakamura in view of Lia; rejected claims 14 and 15 under 35 USC § 103(a) as being unpatentable over Mihalca or Nakamura in view of Carbery; and rejected claims 17 and 18 under 35 USC § 103(a) as being unpatentable over Mihalca or Nakamura in view of Carbery and further in view of Woodgate et al. For at least the reasons stated below, Applicant respectfully submits that all claims pending in this application are in condition for allowance.

Regarding the rejection of claim 1, from which claims 5, 8-15, 17, and 18 depend, this claim now recites, *inter alia*, "wherein said light shield plate is disposed in proximity to an image

sided principle point of said objective lens system." Contrary to the Examiner's assertion, none of the cited references teaches or suggests at least this claimed recitation. Due to this claimed relationship, the device may function so that image light has difficulty escaping and the light shield plate is made close to the objective lens such that the light shield plate becomes closest to the image side principle point. As a result, the light shield plate may function as an aperture stop. See page 6, line 21-page 7, line 19. Accordingly none of the cited references may anticipate or be combined to achieve the invention claimed in claim 1.

In addition, it is possible to integrate the objective lens and the light shield plate with each other because the light shield plate is made close to the objective lens. It may be advantageous when, as described in claim 16, the part is used with an ordinary video camera as an attachment. It may also be advantageous to exchange the light shield plate with the replacement of the objective lens. See page 10, line 15-page 11, line 6. This function and effect is neither taught nor suggested by any of the cited references.

Regarding claim 16, which is directed to a light shield fitted in the optical path of a video camera, none of the cited references teach or suggest such a part. According to the invention, a user may pick up a stereoscopic image using an ordinary video camera with the part as described in claim 16. This function and effect is not taught or suggested by the cited references. None of the cited references disclose the idea of using an ordinary video camera to capture a stereoscopic image. The invention of claim 16 may allow any person to conveniently capture a stereoscopic image. Accordingly, Applicant believes claim 16 is allowable over the cited references.

In view of the foregoing all of the claims in this case are believed to be in condition for allowance. Should the Examiner have any questions or determine that any further action is desirable to place this application in even better condition for issue, the Examiner is encouraged to telephone applicants' undersigned representative at the number listed below.

SHAW PITTMAN LLP
1650 Tysons Boulevard
McLean, VA 22102
Tel: 703/770-7606

Respectfully submitted,

YAMAMOTO, MASAO

Date: April 30, 2003

By: Laurence D. Lin (41,009)
for Michael D. Bednarek
Registration No. 32,329

Attachments: Amended Spec. w/ Markings
Amended Claims w/ Markings

MDB/BCM

VERSION WITH MARKINGS TO SHOW CHANGES MADE TO SPECIFICATION

Please replace the first full paragraph on page 12 as follows:

For example, the polarizing plates disposed on the openings of the light shield plate are arranged in such a manner that the vibration planes of the lights that have passed through the polarizing plates are orthogonal to each other, and the orientation of the selection polarizing plate is arranged in such a manner that the vibration plane of the light that has passed through the selection polarizing plate coincides with any one of the vibration planes of the lights that have passed through said polarizing plates. The polarizing plate alternately takes a state in which the vibration plane of the polarized light is allowed to pass as it is without rotating and a state in which the vibration plane of the polarized light is rotated by 90°. With the above structure, the above-mentioned passing light selecting means can be realized.

Please replace the first full paragraph on page 30 as follows:

In this embodiment, the liquid crystal plate 120 allows the light to pass therethrough without changing the orientation of its vibration plane if the voltage is any one of on/off, and allows the light to pass therethrough after rotating the orientation of the vibration plane if the voltage is the other of on/off. In this embodiment, the liquid crystal plate 120 allows the light to pass therethrough without any change if the power supply is off, and allows the light to pass therethrough after rotating the vibration plane by 90º if the power supply is on, although the present invention is not limited to this structure.

Please replace the first full paragraph on page 32 as follows:

The visual angle α is set in accordance with the degree of the roughness of an object to be subjected to stereoscopic vision and the circumstances that how the stereoscopic effect given to the viewer is going to be set. For example, if the stereoscioic effect is going to be large, the visual angle α may be set to be large. In general, the degree of the visual angle $\alpha$is set to about 6 to 14 degrees.

Please replace the paragraph starting at the end of page 35 and continuing onto page 36 as follows:

In this example, the liquid crystal plate 120 alternately repeats a state in which the vibration plane of the light that has passed through the liquid crystal plate 120 is rotated by 90^{o} and a state in which the light that has passed through the liquid crystal plate 120 passes as it is while repeating the on/off operation of the voltage supply under the control by the control section 130.

Please replace the first full paragraph on page 36 as follows:

In the case where the liquid crystal plate 120 is in the state where the vibration plane of the light that has passed through the liquid crystal plate 120 is rotated by 90^{o}, the image light for the left eye whose vibration is directed forward and backward with respect to the paper surface of Fig. 1 changes the direction of its vibration plane to the right and left direction with respect to the paper surface by passing through the opening 221A. On the other hand, the image light for

the right eye whose vibration is directed rightward and leftward with respect to the paper surface of Fig. 1 changes the direction of its vibration plane to the forward and backward direction with respect to the paper surface by passing through the opening 221B.

Please replace the second full paragraph on page 49 as follows:

In this embodiment, the liquid crystal plates 120 allow the lights to pass therethrough as they are if the power supply is off, and allow the lights to pass therethrough after rotating their vibration planes by 90º if the power supply is on although the present invention is not limited to this structure.

Please replace the first full paragraph on page 50 as follows:

Then, the image light for the left-eye image and the image light for the right-eye image which have been polarized into the linear polarized lights reach the liquid crystal plates 120, respectively. Each of the liquid crystal plates 120 continuously takes the state in which the light is allowed to pass through the liquid crystal plate 120 without changing the orientation of the vibration plane and the state in which the light is allowed to pass through the liquid crystal plate 120 after rotating the vibration plane by 90º, as described above.

Please replace the paragraph starting on page 51 and continuing onto page 52 as follows:

In the case where each of the liquid crystal plates 120 is in the state where the light is allowed to pass through the liquid crystal plate 120 after rotating its vibration plane by 90º, the

image light for the left-eye image and the image light for the right-eye image are directed to the selection polarizing plates 125 disposed in the respective optical paths after changing the orientations of the vibration planes to the forward and backward directions with respect to the paper surface. In this embodiment, as described above, the selection polarizing plates shield the component directed forward and backward with respect to the paper surface among the light components, and allow a component directed rightward and leftward with respect to the paper surface to pass through the selection polarizing plates. Accordingly, the image light for the left-eye and the image light for the right-eye which are the linear polarized lights having the vibration planes directed forward and backward with respect to the paper surface are shielded by the selection polarized plates 125.

Please replace the first full paragraph on page 52 as follows:

Consequently, in this embodiment, in the case where the liquid crystal plates 120 are in the state where the lights are allowed to pass through the liquid crystal plates 120 after rotating their vibration planes by 90^{o}, both of the image light for the left-eye image and the image light for the right-eye image are not picked up without reaching the image pickup device 110.

Please replace the first full paragraph on page 53 as follows:

The left-eye shutter means and the right-eye shutter means are independent from each other. Therefore, in the above-described example, the left-eye shutter means and the right-eye shutter means are identical in structure with each other, but may be different in structure from

each other if the image light for the left eye and the image light for the right eye are alternately guided to the image pickup element 110. For example, even if one of the polarizers 222A and 222B is disposed with being rotated by 90° and the on/off control of the voltage supply to both the liquid crystal plates 120 are conducted at the same timing, the same stereoscopic image data as that in the above case can be produced.

Please replace the paragraph starting on page 57 and continuing onto page 58 as follows:

The case 510 is shaped into a box and accommodates the display screen 520, the polarizing plate 530, the polarization plane rotating plate 540, the visual field lens 550, the frame memory 610 and the control section 620 therein. A visual field hole 511 is defined in the case 510. The visual field hole 511 is so designed as to view the display screen 520 disposed in the interior of the case 510 from the visual field hole 511 to conduct the stereoscopic vision. Viewer side polarizers 512 and 513 are fitted into the visual field hole 511 so as to correspond to the positions of the left eye and the right eye of the viewer who conducts the stereoscopic vision, respectively. Each of the viewer side polarizers 512 and 513 polarizes the light that has passed through the polarizer into a polarized light having a given vibration plane. The viewer side polarizers 512 and 513 are so designed as to polarize the lights that have passed through the polarizers 512 and 513 into the polarized lights having the vibration planes different in orientation from each other. In this embodiment, the vibration planes of the lights that have passed through polarizers have the relationship of 90°. More specifically, the viewer side polarizer 512 is so designed as to polarize the light that has passed through the polarizer 512 into

a polarized light having the vibration plane directed forward and backward with respect to the paper surface of Fig. 9, and the viewer side polarizer 513 is so designed as to polarize the light that has passed through the polarizer 513 into a polarized light having the vibration plane directed rightward and leftward with respect to the paper surface of Fig. 9.

Please replace the paragraph starting on page 60 and continuing onto page 61 as follows:

In the polarization plane rotating plate 540 of this embodiment, the rotating plate 520A is formed of a plate resulting from thinly molding a 1/4 wavelength plate which allows the light to pass through the plate after rotating the vibration plane of the polarized light by 90°, and the non-rotating plate 520B is formed of a plate resulting from thinly molding a resin which allows the light to pass through the plate without giving some influence on the vibration plane of the polarized light, and those rotating plates 520A and 520B are alternately disposed into a sheet.

Please replace the paragraph beginning on page 61 and continuing onto page 62 as follows:

Of the display screen 520, the light emitted from the first region 520L for displaying the left-eye image passes though the polarizing plate 530 and is then polarized into the polarized light having the vibration plane directed forward and backward with respect to the paper surface of Fig. 9. Since the image light passes through the rotating plate 520A and the vibration plane of the polarized light rotates by 90°, the vibration plane of the polarized light is directed rightward and leftward with respect to the paper surface of Fig. 9. That is, the image light from the left-eye

image is polarized into the polarized light having the polarization plane directed rightward and leftward with respect to the paper surface of Fig. 9, and then transmitted toward the visual field hole 511 through the visual field lens 550.

Please replace the paragraph starting on page 62 and continuing onto page 63 as follows:

In the polarization plane rotating plate 540 of this embodiment, the rotating plate 520A is formed of a plate resulting from thinly molding a 1/4 wavelength plate which allows the light to pass through the plate after rotating the vibration plane of the polarized light by 90^{o}, the non-rotating plate 520B is formed of a plate resulting from thinly molding a resin which allows the light to pass through the plate without giving some influence on the vibration plane of the polarized light, and those rotating plates 520A and 520B are alternately disposed into a sheet.

Please replace the abstract as follows:

ABSTRACT

In a stereoscopic image pickup device, an image pickup device A accommodates one image pickup element 110 to which an image light for a left eye and an image light for a right eye for picking up a left-eye image and a right-eye image are guided, and one objective lens in a case. A light shield plate 220 having two openings defined is disposed between the image pickup element 110 and the objective lens 210. Polarizers that polarize lights which have passed therethrough into linear polarized lights whose vibration planes are orthogonal to each other are fitted into those two openings. A liquid crystal plate 120 and a selection polarizing plate 125 are

disposed between the objective lens and the image pickup element 110. The selection polarizing plate 125 polarizes a light that has passed therethrough into a linear polarized light whose vibration plane has the same orientation as that of the light that has passed through any one of the above-mentioned polarizers. The liquid crystal plate 120 alternately takes a state where the polarized light is allowed to pass through the liquid crystal plate 120 after rotating the vibration plane of the polarized light that has passed through the above-mentioned opening by 90 degrees and a state the polarized light is allowed to pass through the liquid crystal plate 120 as it is. As a result, the image lights that have passed those two openings are alternately picked up by the one image pickup element 110.

VERSION WITH MARKINGS TO SHOW CHANGES MADE TO CLAIMS

1. (Amended) A device for picking up a stereoscopic image, comprising:

one image pickup element to which an image light for a left eye and an image light for a right eye are guided for picking up an image for the left eye and an image for the right eye which are used as a stereoscopic image and given an appropriate visual angle;

a left-eye shutter disposed in an optical path of the image light for the left eye for taking any one of a shield state where the image light for the left eye is shielded and a pass state where the image light for the left eye is allowed to pass; [and]

a right-eye shutter means for taking any one of a shield state where the image light for the right eye is shielded and a pass state where the image light for the left eye is allowed to pass;

one objective lens system that allows the image light for the left eye and the image light for the right eye to pass;

one light shield plate having two openings defined therein so that one light that has passed through one of those two openings in said light shield plate becomes the image light for the left eye, and the other light that has passed through the other opening in said shield plate becomes the image light for the right eye; and

one objective lens system that allows the image light for the lefy ey and the image light for the right eye to pass,

wherein said left-eye shutter means and said right-eye shutter means are alternately put into the pass state to make said image pickup element alternately pick up the image light for the right eye and the image light for the left eye,

wherein said light shield plate is disposed in proximity to an image sided principle point of said objective lens system, and

wherein said objective lens system comprises one objective lens, and said light shield plate is disposed close to any surface of said objective lens.

5. (Amended) The device for picking up a stereoscopic image as claimed in claim [3] 1, wherein the two openings are disposed eccentrically from the optical axis of said objective lens system by regular distances, respectively.

8. (Amended) The device for picking up a stereoscopic image as claimed in claim [3] 1, wherein each of said left-eye shutter means and said right-eye shutter means includes a shutter plate that is disposed to be movable forward and backward in an optical path of the image light for the left eye or the image light for the right eye, through which the light does not pass, and wherein said shutter plate is disposed in each of the openings of said light shield plate.

9. (Amended) The device for picking up a stereoscopic image as claimed in claim [3] 1, wherein said left-eye shutter means and said right-eye shutter means includes a polarizing plate, said polarizing plate [comprises] comprising:

two polarizing plates each of which polarizes the image light that has passed through one polarizing plate into the polarized light different in an orientation of a vibrating face from the image light that has passed through another polarizing plate; and

a passing light selecting means for alternately taking a first state in which one image light which has been polarized into the polarized light is shielded and the other image light is allowed to pass, and a second state in which the other image light which has been polarized into the polarized light is shielded, and said one image light is allowed to pass.

11. (Amended) The device for picking up a stereoscopic image as claimed in claim [3] 1, wherein each of said left-eye shutter means and said right-eye shutter means comprises:

a polarizing plate that is disposed on each of the openings of the light shield plate and polarizes the light that has passed through the light shield plate into a polarized light;

a liquid crystal plate that takes a non-rotation state where the image light that has been polarized into a polarized light by said polarizing light plate is allowed to pass without changing the orientation of its vibration plane and a rotation state where the image light that has been polarized into a polarized light by said polarizing plate is allowed to pass after its vibration plane has been rotated; and

a selection polarizing plate that allows the image light that has passed through said liquid crystal plate to pass in one state of said non-rotation state and said rotation state, and shields the image light that has passed through said liquid crystal plate in the other state of said non-rotation state and said rotation state.

12. (Amended) The device for picking up a stereoscopic image as claimed in claim [9] 10, wherein said objective lens and said light shield plate are integrated with each other, said image pickup element, said liquid crystal plate and said selection polarizing plate are integrated

together, and said image pickup element, said liquid crystal plate and said selection polarizing plate are [separatable] separable from said objective lens and said light shield plate.

16. (Amended) A [part] light shield plate which [are] is fitted in an optical path of image light of a video camera having one image pickup element and guides image light for [the] a left-eye image and image light for [the] a right-eye image to which an appropriate visual angle is given to said image pickup element, to thereby pick up a stereoscopic image by said video camera; wherein said [part] light shield plate has two openings, one light that has passed through on of the openings in said light shield plate becomes the image light for [the] a left eye, and another light that has passed through the other opening in said light shield plate becomes the image light for [the] a right eye; and wherein a shutter plate through which a light does not pass and which is so disposed as to be movable forward and backward in an optical path of the left-eye image light or the right-eye image light is disposed in each of the openings.